

We claim:

1. A method of decreasing infection of a host cell by a pathogen, comprising decreasing activity of Rab9A or Rab11A in the host cell, wherein decreasing activity of Rab9A or Rab11A decreases infection of the host cell by the pathogen.
- 5 2. The method of claim 1, wherein decreasing activity of Rab9A comprises decreasing activity of a Rab9A modulator that increases Rab9A activity or increasing activity of a Rab9A modulator that decreases Rab9A activity.
- 10 3. The method of claim 1, wherein decreasing activity of Rab11A comprises decreasing activity of a Rab11A modulator that increases Rab11A activity, or increasing activity of a Rab11A modulator that decreases Rab11A activity.
- 15 4. The method of claim 1, wherein the pathogen hijacks a lipid raft.
5. The method of claim 4, wherein the pathogen that pathogen hijacks a lipid raft is *Campylobacter jejuni*, *Vibrio cholerae*, SV40, *Legionella pneumophila*, *Aeromonas hydrophila*, Echovirus 1, Echovirus 11, *Brucella* spp, *Clostridium* spp., Avian sarcoma and leukosis virus, *Escherichia coli*, *Streptococcus pyogenes*, Semiliki forest virus, *Salmonella typhimurium*,
20 *Bacillus anthracis*, Ecotropic mouse leukaemia virus, *Shigella flexneri*, *Bacillus thuringiensis*, HTLV-1, *Chlamydia* spp., *Helicobacter pylori*, HIV-1, *Mycobacterium* spp., *Lysteria monocytogenes*, *Ebola*, *Marburg*, Measles, Herpes Simplex virus, influenza virus, respiratory syncytia virus (RSV), or Epstein-Barr virus.
- 25 6. The method of claim 4, wherein the pathogen that hijacks a lipid raft comprises an enveloped RNA virus.
7. The method of claim 6, wherein the enveloped RNA virus comprises human immunodeficiency virus (HIV)-1, HIV-2, Ebola virus, Marburg virus, RSV, or measles virus.
- 30 8. The method of claim 1, wherein decreasing activity of Rab9A or Rab11A comprises decreasing an amount of mRNA encoding Rab9A or Rab11A.
9. The method of claim 8, wherein decreasing an amount of mRNA encoding Rab9A comprises
35 contacting the mRNA with any of SEQ ID NOS: 5-9, 16-32, or 47-66.

10. The method of claim 2, wherein the Rab9A modulator that increases Rab9A activity is a v-SNARE protein, a t-SNARE protein, a GDP dissociation inhibitor, a guanine-nucleotide exchange factor (GEF), a guanine-nucleotide displacement factor (GDF), mannose-6-phosphate receptor, TIP47, or a Rab9A effector.
- 5 11. The method of claim 10, wherein the Rab9 effector is p40.
12. The method of claim 10, wherein the GDF is Yip3.
- 10 13. The method of claim 2, wherein the Rab9A modulator that increases Rab9A activity is PIKfyve, TIP47, or p40.
14. The method of claim 3, wherein the Rab11A modulator that increases Rab11A activity is Sec15, Rip11, FIP1, FIP2, FIP3/eferin, FIP4, or Rab-coupling protein (RCP).
- 15 15. The method of claim 1, wherein Rab9A is encoded by a host nucleic acid comprising at least 90% sequence identity to a target nucleic acid sequence associated with SEQ ID NO: 1 or 2.
16. The method of claim 15, wherein the host nucleic acid comprises a target nucleic acid
20 sequence associated with SEQ ID NO: 1 or 2.
17. The method of claim 2, wherein decreasing activity of Rab9A comprises decreasing activity of one or more Rab9A modulators that enhance Rab9A activity.
- 25 18. The method of claim 3, wherein decreasing activity of Rab11A comprises decreasing activity of one or more Rab11A modulators that enhance Rab11A activity.
19. The method of claim 1, wherein decreasing activity of Rab9A comprises decreasing activity of Rab9A and one or more Rab9A modulators that enhance Rab9A activity.
- 30 20. The method of claim 1, wherein decreasing activity of Rab11A comprises decreasing activity of Rab11A and one or more Rab11A modulators that enhance Rab11A activity.
21. The method of claim 1, wherein decreasing the activity of Rab9A or Rab11A comprises
35 decreasing an interaction of a pathogen protein and a Rab9A protein, decreasing an interaction of a pathogen protein and a Rab11A protein, decreasing an interaction of a pathogen protein and a Rab9A modulator protein, or decreasing an interaction of a pathogen protein and a Rab11A

modulator protein, by decreasing expression of the Rab9A protein, the Rab11A protein, the Rab9A modulator protein, or the Rab11A modulator protein.

22. The method of claim 21, wherein the pathogen protein comprises a virus and decreasing the
5 interaction of the virus and the Rab9A protein, the Rab11A protein, the Rab9A modulator protein, or the Rab11A modulator protein, decreases infection of a host cell by the virus.

23. The method of claim 21, wherein decreasing expression of the Rab9A protein, the Rab11A
10 protein, the Rab9A modulator protein, or the Rab11A modulator protein, comprises decreasing transcription of an mRNA encoding the Rab9A protein, the Rab11A protein, the Rab9A modulator protein, or the Rab11A modulator protein.

24. The method of claim 23, wherein decreasing transcription of the mRNA comprises inserting
15 a transposon or insertional vector into a coding region of a nucleic acid sequence encoding the Rab9A protein, the Rab11A protein, the Rab9A modulator protein, or the Rab11A modulator protein.

25. The method of claim 23, wherein decreasing the transcription of the mRNA comprises
20 contacting the mRNA with an antisense RNA, triple helix molecule, ribozyme, microRNA, or siRNA that recognizes the mRNA.

26. The method of claim 25, wherein the siRNA sequence comprises one or more of SEQ ID NOS: 5-9 and 16-32.

25 27. The method of claim 25, wherein the antisense RNA sequence comprises one or more of SEQ ID NOS: 47-56.

28. The method of claim 25, wherein the ribozyme RNA sequence comprises one or more of
30 SEQ ID NOS: 57-66.

29. The method of claim 25, wherein the host cell is present in a subject, and contacting the
mRNA with an antisense RNA, triple helix molecule, ribozyme, microRNA, or siRNA that
recognizes the mRNA comprises administering the antisense RNA, triple helix molecule,
ribozyme, microRNA, or siRNA to the subject.

35 30. The method of claim 21, wherein decreasing an interaction of a pathogen protein and the Rab9 protein, the Rab11A protein, the Rab9A modulator protein, or the Rab11A modulator

protein, comprises contacting the host cell with an agent that decreases the activity of the Rab9A protein, the Rab11A protein, the Rab9A modulator protein, or the Rab11A modulator protein.

31. The method of claim 30, wherein the host cell is present in a host subject and wherein
5 contacting the host cell with the agent comprises administering the agent to the subject.

32. The method of claim 30, wherein the agent is an anti-protein binding agent that specifically binds to the Rab9A protein, the Rab11A protein, the Rab9A modulator protein, or the Rab11A modulator protein, wherein the anti-protein binding agent decreases an interaction between the
10 Rab9 protein, the Rab11A protein, the Rab9A modulator protein, or the Rab11A modulator protein, and the pathogen.

33. The method of claim 32, wherein the anti-protein binding agent is an antibody or chemical compound.
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34. The method of claim 1, wherein the host cell is a mammalian host cell.

35. A method of treating a pathogen infection in a host subject, comprising:
administering to a subject having a pathogen infection an effective amount of an agent
20 that interferes with the interaction of a pathogen and host protein, wherein the host protein is Rab9A, Rab11A, a Rab9A modulator that enhances Rab9A activity, or a Rab11A modulator that enhances Rab11A activity.

36. The method of claim 35, wherein the agent decreases expression of a nucleic acid sequence
25 encoding Rab9A, Rab11A, a Rab9A modulator that enhances Rab9A activity, or a Rab11A modulator that enhances Rab11A activity.

37. The method of claim 35, wherein the agent is an antisense, triple helix molecule, ribozyme, microRNA, or siRNA molecule that recognizes a nucleic acid sequence encoding Rab9A,
30 Rab11A, a Rab9A modulator that enhances Rab9A activity, or a Rab11A modulator that enhances Rab11A activity.

38. The method of claim 35, wherein the effective amount induces a prophylactic effect in the host, which decreases infection of the host by a pathogen.
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39. The method of claim 35, wherein the host was previously infected by a pathogen and the effective amount induces a therapeutic effect in the host.

40. A method of identifying an agent that decreases pathogenicity of a pathogen, the method comprising:

contacting a test agent with a Rab9A target or a Rab11A target; and
determining whether the test agent decreases Rab9A activity or Rab11A activity,
wherein a decrease in Rab9A activity or Rab11A activity, indicates the agent decreases
pathogenicity of the pathogen.

41. The method of claim 40, wherein the pathogen is a pathogen that hijacks a lipid raft.

42. The method of claim 41, wherein the pathogen that hijacks a lipid raft comprises
Campylobacter jejuni, *Vibrio cholerae*, SV40, *Legionella pneumophila*, *Aeromonas hydrophila*,
Echovirus 1, Echovirus 11, *Brucella* spp., *Clostridium* spp., Avian sarcoma and leukosis virus,
Escherichia coli, *Streptococcus pyogenes*, Semiliki forest virus, *Salmonella typhimurium*,
Bacillus anthracis, Ecotropic mouse leukaemia virus, *Shigella flexneri*, *Bacillus thuringiensis*,
HTLV-1, *Chlamydia* spp., *Helicobacter pylori*, HIV-1, *Mycobacterium* spp., *Lysteria*
monocytogenes, *Ebola*, *Marburg*, Measles, Herpes Simplex virus, influenza virus, respiratory
syncytia virus (RSV), or Epstein-Barr virus.

43. The method of claim 40, wherein determining whether the test agent decreases Rab9A
activity or Rab11A activity comprises determining whether the test agent decreases expression
in a cell of Rab9A, Rab11A, a Rab9A modulator that affects Rab9A activity, or a Rab11A
modulator that affects Rab11A activity.

44. The method of claim 43, wherein determining whether the test agent decreases expression of
Rab9A, Rab11A, a Rab9A modulator that affects Rab9A activity, or a Rab11A modulator that
affects Rab11A activity, comprises determining whether the test agent decreases a level of
Rab9A mRNA, Rab11A mRNA, a Rab9A modulator mRNA that affects Rab9A activity, or a
Rab11A mRNA modulator that affects Rab11A activity in the cell.

45. The method of claim 40, wherein the pathogen comprises a virus, bacterium or protozoa.

46. The method of claim 45, wherein the pathogen comprises a virus.

47. The method of claim 46, wherein the virus includes a viral envelope protein.

48. The method of claim 46 wherein the virus comprises and enveloped RNA virus.

49. A cell comprising a functional deletion of a Rab9A gene, Rab11A gene, or a modulator gene thereof that increases Rab9A or Rab11A activity, wherein the cell has a decreased susceptibility to infection by a pathogen that hijacks a lipid raft.

50. A non-human transgenic mammal comprising a functional deletion of a Rab9A gene, a Rab11A gene, or a modulator gene thereof that increases Rab9A or Rab11A activity, wherein the mammal has decreased susceptibility to infection by a pathogen that hijacks a lipid raft.

51. A method of identifying a modulator of Rab9A or Rab11A involved in infection by a pathogen that hijacks a lipid raft, comprising:

reducing expression of a putative Rab9A or Rab11A modulator in a cell that expresses Rab9A or Rab11A;

contacting the cell with a pathogen that hijacks a lipid raft; and

detecting an amount of infection by the pathogen that hijacks a lipid raft, wherein a decrease in infection indicates that the putative Rab9A or Rab11A modulator is a Rab9A or Rab11A modulator, respectively, involved in infection by the pathogen that hijacks a lipid raft.

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52. The method of claim 51, further comprising associating the amount of infection with an amount of Rab9A or Rab11A nucleic acid molecule, protein, or activity, wherein the presence of a decrease in infection and a decrease in the amount of Rab9A or Rab11A indicates that the putative modulator of Rab9A or Rab11A is a modulator of Rab9A or Rab11A, respectively, involved in infection by the pathogen that hijacks a lipid raft.

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53. The method of claim 51, wherein decreasing expression of the putative modulator of Rab9A or Rab11A comprises decreasing an amount of mRNA encoding the putative modulator of Rab9A or Rab11A.

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54. A method of determining resistance or susceptibility to pathogen infection in a subject, comprising comparing a first nucleic acid sequence of a subject to a second nucleic acid sequence comprising a Rab9A, Rab11A, a Rab9A modulator, or a Rab11A modulator sequence, wherein a higher similarity between the first and second nucleic acid sequence indicates the subject is more susceptible to pathogen infection, and wherein a lesser similarity between the first and second nucleic acid sequence indicates the subject is more resistant to pathogen infection.

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55. The method of claim 54, wherein the first nucleic acid sequence is obtained from a biological sample of the subject.

5 56. The method of claim 54, wherein the first nucleic acid sequence comprises a plurality of nucleic acid sequences, wherein each nucleic acid sequence is obtained from a different subject.

57. The method of claim 56, further comprising determining a polymorphic variation within a population.

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58. An isolated nucleic acid sequence comprising any nucleic acid sequence shown in SEQ ID NOS: 5-9, 16-32, or 47-66.

59. A vector comprising the isolated nucleic acid sequence of claim 58.